

### **REMARKS**

Claims 1-32, 38-41 and 70-72 are cancelled; new claim 73 is added; claims 33 and 42 are amended; and claims 33-37, 42-69 and 73 are pending in the application.

Applicant affirms election to the claims of Group II (claims 33-72).

The specification is amended to correct a few minor typographical errors recently discovered by Applicant.

Claims 33-37 and 42-69 stand rejected over Hard, Hirao, Onishi, Tobioka, Yagi, Muenz, Oohashi, Eck, Bugliosi, Heikinheimo, and Ludtke. Applicant has amended independent claims 33 and 42, and believes that such amendments place the claims in condition for allowance. Further, as claims 34-37 and 43-69 depend from claims 33 and 42, Applicant believes that claims 34-37 and 43-69 are also in condition for allowance.

Referring initially to claim 33, Applicant's amendment adds a limitation that the recited material comprising tantalum and titanium is an electrolytically formed material. Support for applicants' amendment to claim 3 can be found in the specification at, for example, page 3, lines 25-28, wherein the specification indicates that the invention encompasses methods of forming mixed-metal products by electrolysis. Applicant's specification also provides numerous descriptions of differences between the mixed-metal products formed through electrolytic methods of the present invention relative to mixed-metal products formed by prior art methods, such as, for example, powder processing. For instance, Applicant's specification indicates at page 1, lines 22-27 that powder processing can allow segregation to easily take place within a mixed metal material during the processing, and also that materials formed by powder processing generally have a relatively high, and undesired, gas content. Applicant's specification goes on to state at,

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for example, page 11, lines 16-21 that mixed metal products formed utilizing the electrolytic methodology of the invention are essentially microscopically homogenous; and at page 14, lines 2-14, that the mixed metal products formed in accordance with electrolytic methodologies of the present invention have little or no segregation of the metallic materials mixed therein, and specifically that such is a substantial improvement over prior art methodologies for forming mixtures of titanium and tantalum.

Accordingly, a mixture of titanium and tantalum formed electrolytically in accordance with methodology of the present invention is quantifiably different than mixtures formed utilizing prior art methodologies. The claim 33 recited product comprising tantalum and titanium formed by an electrolytic process is therefore novel relative to titanium and tantalum products formed by other processes. As not one of the Examiner's cited references discloses or suggests a titanium/tantalum product formed by electrolytic processing, claim 33 is patentable over the references regardless of whether the references are cited alone, or in any combination. Applicant therefore requests formal allowance of claim 33 in the Examiner's next action.

Applicant's amendment to claim 42 limits the recited material to a material which consists essentially of at least one element selected from a group consisting of titanium, tantalum, zirconium, hafnium and niobium together with at least one second element selected from the group consisting of vanadium and nickel. The Examiner's cited references do not suggest or disclose any material which consists essentially of one element selected from the group consisting of titanium, tantalum, zirconium, hafnium and niobium together with at least one second element selected from the group consisting of


vanadium and nickel. Accordingly, amended claim 42 is believed allowable over the cited references, and Applicant requests such allowance in the Examiner's next action.

New claim 73 is also believed allowable. New claim 73 recites a PVD target which consists essentially of Hf and Cr. Claim 73 recites one of the permutations that was previously contained amongst the combination of claim 42 and claim 69 (which depended from claim 42). The target recited in claim 73 is not disclosed or suggested by the Examiner's cited references, and Applicant therefore believes the subject matter of claim 73 to be allowable.

Claims 33-37, 42-69 and 73 are allowable over the examiners cited references for the reasons discussed above. Applicant therefore requests formal allowance of such claims in the Examiner's next action.

Respectfully submitted,

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By:   
David G. Latwesen, Ph.D.  
Reg. No. 38,533

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Inventor..... G. Wang  
Assignee..... Honeywell International Inc.  
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Examiner ..... H.D. Wilkins, III  
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VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING  
RESPONSE TO MAY 31, 2002 OFFICE ACTION

**In the Specification**

The replacement specification paragraphs incorporate the following amendments.

Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

The title has been amended as follows:

~~Methods For Electrically Forming Materials; And~~ Mixed Metal Materials

The paragraph beginning at line 4 on page 1 has been amended as follows:

The invention pertains to methods of ~~electrically~~ electrolytically forming materials comprising at least two elements, and in particular applications pertains to methods of forming materials comprising tantalum and titanium. The invention also pertains to mixed metal materials, such as materials comprising tantalum and titanium. In addition, the invention pertains to sputtering targets made of mixed metal materials, such as targets comprising tantalum and titanium.

The paragraph beginning at line 4 on page 9 has been amended as follows:

Fig. 2 illustrates an apparatus 50 comprising a cathode 52 and a pair of anodes 54 and 56. Apparatus 50 further includes a vessel 58 comprising a furnace 80 and a liner 62; with an electrolyte solution 64 shown contained within vessel 58. Vessel 58 can comprise a construction identical to that described above with reference to vessel 18 of Fig. 1. Cathode 52 can comprise a construction identical to that described above with reference to cathode 12, and anode 54 can comprise a construction identical to that described above with reference to anode 14. The difference between the apparatus 50 of Fig. 2 and the apparatus 10 of Fig. 1 is that apparatus 50 comprises a second anode 56, in addition to the first anode 54. Anode 54 is coupled to cathode 52 ~~to~~ through a first voltage (or potential) 68, and anode 56 is coupled to cathode 52 ~~to~~ through a second voltage 70.

The paragraph beginning at line 9 on page 13 has been amended as follows:

The thermo-mechanically processed material can ~~then~~ be shaped into a form suitable for desired industrial applications. For instance, the material can be shaped into a PVD target, such as, for example, a sputtering target.

### **In the Claims**

The claims have been amended as follows. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

Cancel claims 1-32, 38-41 and 70-72.

33. (Amended) An electrolytically formed A material which comprises a mixture of tantalum and titanium; and which is at least 99.9 weight percent tantalum and titanium.

42. (Amended) A material which consists essentially of:  
at least one first element selected from the group consisting of titanium, tantalum, zirconium, hafnium, and niobium; and  
at least one second element selected from the group consisting of ~~titanium, tantalum, zirconium, hafnium, niobium, vanadium, aluminum, chromium and nickel; and~~  
~~wherein the at least one first element is different from the at least one second element.~~

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